

Assignment

Write

Write the term that best completes each statement.

1. The terminal ray of an angle in standard position is the ray with its endpoint at the origin that is not the _____.
2. The _____ of a periodic function is one half the absolute value of the difference between the maximum and minimum values of the function.
3. An angle is in _____ when the vertex is at the origin and one ray of the angle is on the x -axis.
4. A _____ is a function whose values repeat over regular intervals.
5. The _____ of a periodic function is a reference line whose equation is the average of the minimum and maximum values of the function.
6. The _____ of a periodic function is the length of the smallest interval over which the function repeats.
7. The measure of an angle in standard position is the amount of rotation from the initial ray to the _____.

Remember

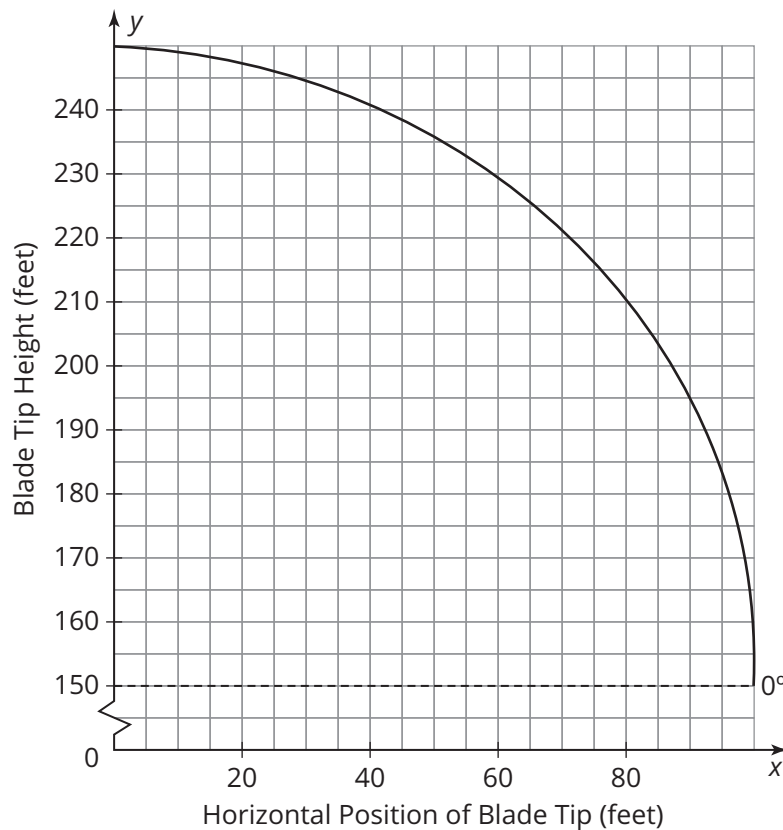
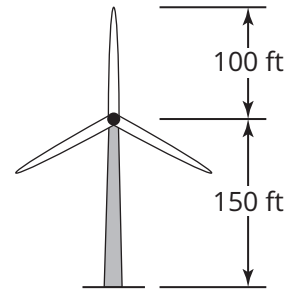
A periodic function is a function whose values repeat over regular intervals. The period of a periodic function is the length of the smallest interval over which the function repeats.

Practice

1. Wind turbines harness the power of the wind to generate electricity.

One particular wind turbine consists of three 100-foot-long rotor blades that rotate around the top of a 150-foot vertical shaft.

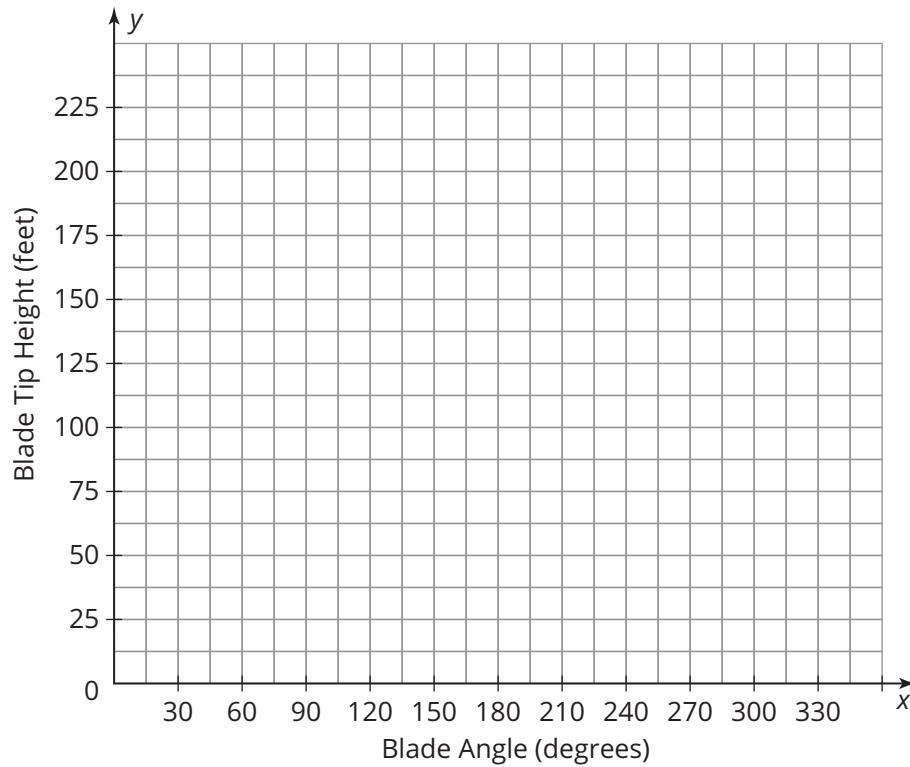
- a. Use a protractor, a straightedge, and the given graph to estimate the height of the blade tip when the blade is at angles of 0° , 30° , 45° , 60° and 90° . The arc on the graph represents a portion of the blade tip's path. Assume the blade rotates counterclockwise and the blade is at an angle of 0° when the blade tip is directly to the right of the top of the vertical shaft. This position has been labeled as 0° on the graph.



- b. Complete the table using your knowledge of the symmetry of circles.

Blade Angle	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°
Tip Height (feet)											

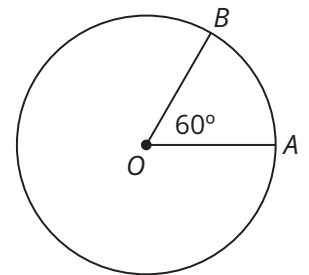
c. Graph the blade tip height as a function of the blade angle.



- d. Determine the equation of the midline for the periodic function you graphed in part (c). Sketch and label the midline as a dashed line on the graph in part (c).
- e. Determine the amplitude of the function you graphed in part (c). Explain your reasoning.
- f. Determine the period of the function you graphed in part (c). Explain your reasoning.
- g. Determine the height of the blade tip when the blade angle is 570° . Explain your reasoning.

Stretch

- The circle with center O has a radius of 1 unit.
 - Determine the arc length AB .
 - Determine the ratio of the arc length to the radius of the circle.
 - The ratio of the arc length to the radius of the circle is the measure of the central angle in radians. Determine the measure of a central angle of 135° in radians.



Review

1. The following rules are used to create a certain fractal, the Cantor set.

Stage 0: Begin with a line segment.

Stage 1: Divide the line segment into thirds and then erase the middle third.

Stages 2 and up: Repeat Stage 1 for the line segments in the figure.

- a. Complete Stage 2 of the fractal. Stage 0 and Stage 1 are given.

Stage 0 

Stage 1 

Stage 2

Stage	Total Length of Line Segments (in.)
0	
1	
2	
3	
4	
5	
n	


- b. Determine the total length of the line segments at each stage and complete the table. The length of the initial line segment in Stage 0 is 1 in.
- c. Identify the type of sequence represented by the total length of the line segments at Stage n .
- d. Write a function to represent the total length of the line segments as a function of the stage, n . Describe the type of function you used.
2. The following rules are used to create a certain fractal, the von Koch curve.


Stage 0: Begin with a line segment.

Stage 1: Replace the middle segment with an equilateral triangle, and remove the side of the triangle corresponding to the initial straight line.

Stages 2 and up: Repeat Stage 1 for the line segments in the figure.

- a. Complete Stage 2 of the fractal. Stage 0 and Stage 1 are given.

Stage 0 

Stage 1 

Stage	Number of Line Segments
0	
1	
2	
3	
4	
5	
n	

- b. Determine the number of line segments at each stage and complete the table.
- c. Identify the type of sequence represented by the number of line segments at Stage n .
- d. Write a function to represent the number of line segments as a function of the stage, n . Describe the type of function you used.
3. Identify the number of real zeros of each polynomial.
- a. $2x^4 + x^3 + 3x^2 + 3x - 9 = 0$
- b. $x^5 + 2x^4 + 11x^3 + 22x^2 + 24x + 48 = 0$